the distinction between embryos created with somatic cells and those created from an egg and sperm is nontenable."

ES cell workers welcome the report, says Martin Pera of the Monash Institute of Reproduction and Development in Melbourne. Currently, scientists face a jumble of legislation that varies among state and territorial jurisdictions. For instance, Pera and his Monash colleagues derive ES cells in Singapore because it is illegal to do so in the state of Victoria. "This report finally provides a clear framework for Australian scientists," he notes.

In Israel, a national bioethics committee has approved both the derivation of ES cells and research into therapeutic cloning. The report, issued by the Bioethics Advisory Committee of the Israel Academy of Sciences and Humanities on 4 September, does not have the force of law, says committee member and molecular biologist Hermona Soreq of the Hebrew University of Jerusalem, but she expects the national science funding agency to follow its recommendations.

This report lends important formal support for Israel's existing policy, says Nissim Benvenisty, an ES cell researcher at Hebrew University. Joseph Itskovitz of the Rambam Medical Center in Haifa, for instance, has already derived several ES cell lines in Israel.

In 1999, the Israeli Knesset passed a 5-year moratorium on cloning procedures that lead to "the creation of a whole human being." However, the ethics committee wrote that the law "does not rule out producing cloned embryos that will not be implanted," giving the green light to therapeutic cloning. The full report will be published on the academy's Web site at www.academy.ac.il.

–LEIGH DAYTON AND GRETCHEN VOGEL

Leigh Dayton writes from Sydney, Australia.

CONDENSED MATTER

Quantum Condensate Gets a Fresh Squeeze

Cooled to a few billionths of a degree above absolute zero, atoms in a Bose-Einstein condensate (BEC) represent an extreme state of matter. But physicists at the Massachusetts Institute of Technology (MIT) have subjected the atoms in condensates to even more outrageous ordeals, squeezing them into one-dimensional lines and two-dimensional planes. The experiments, reported in the 24 September issue of *Physical Review Letters*, open the door to investigating a new regime of physics in which the rules are easier to understand.

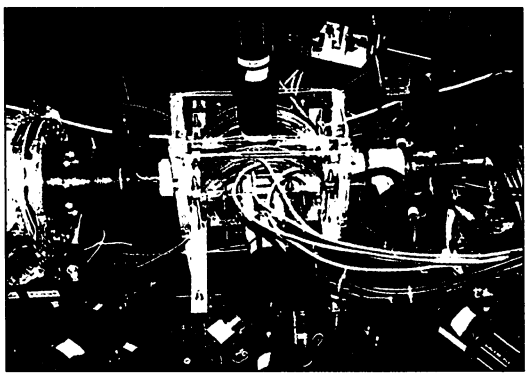
In a BEC, atoms lose their individuality. Cool a clump of matter enough, damping out the random thermal motions of the particles, and the atoms can merge, becoming, in a quantum-mechanical sense, a single coherent object. For the past 5 years, scientists around the world have been experimenting with the strange properties of these atomic ensembles, listening to them ring with sound waves, building atom "lasers" with them (*Science*, 13 February 1998, pp. 986 and 1005), and using them to slow light to a crawl.

But these experiments all probed three-dimensional BECs. One- and two-dimensional systems have "strikingly different physics," says MIT physicist and team member Wolfgang Ketterle. "Critters or creatures in a one-dimensional world can't pass by each other, for example," changing the behavior of the system as a whole, he says.

William Phillips, a Nobel laureate at the National Institute of Standards and Technology in Gaithersburg, Maryland, says lower dimensional BECs are exciting for their potential use in studying phenomena such as solitons—stable waves—within BECs. "In 3D, [solitons] can break up into vortices and phonons. There are instabilities because of these possibilities," he says. "In one dimension, there are fewer things that can happen," making the solitons more stable.

To make lower dimensional BECs, the MIT group started with ordinary 3D BECs made of sodium atoms. For the 1D BEC, the group simply trapped the condensate in strong magnetic fields and stretched it into a cigar shape. The extreme fields made it much easier for atoms in the condensate to flow along the cigar's long axis. As a result, atoms could move in only one dimension if shoved by an outside force. "If you bang it, it's going to respond axially; it's not going to respond radially," says physicist Randall Hulet of Rice University in Houston. (Similar results with lithium atoms were published last month by a French group.)

The 2D BEC took an extra step. Instead of staying in a magnetic trap the entire time, the atoms had to be transferred to an optical trap, where the condensate was confined by a sheet of light. The MIT team then watched as the condensates switched over from three dimensions to two or one dimension.



Torture chamber. The BEC II device at MIT crushes an extreme form of matter into lower dimensions.

CREDIT: W. KETTERLE/MIT

Hulet and Phillips agree that Ketterle's results are only a beginning. Researchers would learn more by watching condensates form in lower dimensions, they say, instead of squeezing a 3D cloud into the required shape. Nonetheless, "it's a first step to being able to do interesting physics in a new regime," Hulet says. Torturing a few sodium atoms is a small price to pay for such an opportunity.

–CHARLES SEIFE

PALEOANTHROPOLOGY

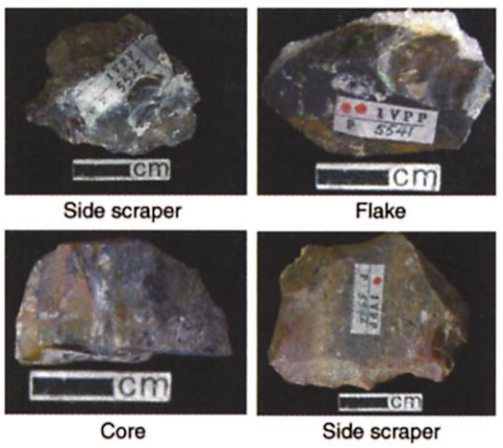
Tools Show Humans Reached Asia Early

If Africa was the cradle of humanity, then Asia was the crossroads of early human migrations. Asia was the first continent that early humans explored on their exodus from Africa and was the jumping-off point for later treks to the New World, Australia, and perhaps Europe. But exactly when early humans first reached Asia has long mystified paleoanthropologists. The first signs of their presence are *Homo erectus* fossils dated to between 1.7 million and 1.9 million years ago in Dmanisi, Georgia, on Asia's western edge, and in Java, Southeast Asia (*Science*, 12 May 2000, p. 948). But there are still questions about some of those dates, and other traces of ancient Asians are questionable until about 1 million years ago.

Now, in this week's issue of *Nature*, the case for an early movement out of Africa is further boosted by new work dating Chinese stone tools to 1.36 million years ago. What's more, the tools were found in relatively cold northern China, by an ancient lake bed 150 kilometers west of Beijing. To reach that spot, early humans must have migrated long distances over difficult terrain, armed only with simple tool kits.

The new report is notable for its "very nice, clean" dating methods on pieces of stone that are indisputable tools rather than natural flakes, says geologist Frank Brown of the University of Utah in Salt Lake City. It also documents "the earliest known penetration of the northern latitudes by early *Homo* in Asia," says paleoanthropologist Russell Ciochon of the University of Iowa in Iowa City. "This demonstrates that *H. erectus* was able to adapt to more seasonal and challenging environments than previously considered."

The stone tools—simple flakes, cores, and scrapers—were found 21 years ago by Chinese geologists in the hilly badlands of the Nihewan Basin, at the northeastern margin of the dust-blown Loess Plateau. Researchers had suspected that artifacts at a half-dozen sites in the basin were more than



Stone ages. New dates put these stone tools from China at 1.36 million years old.

1 million years old, but dating sediments in China has been notoriously difficult because there is no volcanic material for radiometric methods. So the Chinese and American team used high-resolution paleomagnetic dating, relying on known, ancient shifts in Earth's magnetic field to tie the tools to a particular period, says Rixiang Zhu, a geophysicist at the Institute of Geology and Geophysics at the Chinese Academy of Sciences in Beijing.

The members of Zhu's team hung from ropes alongside steep hillsides at two sites in the basin, sampling soil every 25 to 35 centimeters in a vertical column that cut through the horizontal layers of sediment, including the layer of grayish-white clay in which the tools were deposited. This clay layer was laid down during a long period when Earth's polarity was flipped. Sediments bearing the signature of this reversed polarity are sandwiched between a layer indicating normal polarity—a period dated radiometrically at Africa's Olduvai Gorge to 1.77 million to 1.95 million years ago—and another normal-polarity layer dated to 1 million years ago. From the location of the clay layer in the band of reversed-polarity sediments and an estimated sedimentation rate, Zhu and his team, including geophysicist Ken Hoffman of California Polytechnic State University in San Luis Obispo, concluded that the tools were at least 1.36 million years old. The team's efforts impressed dating expert Brown, who calls it "great work" that provides a "jumping-off point" for dating other basin sites.

Although no human fossils have been found in the basin, the tools' antiquity shows that early humans had already managed to adapt to life at 40 degrees north, says coauthor Rick Potts, a paleoanthropologist at the Smithsonian Institution in Washington, D.C. But he adds, "What were they doing at the margin of the range for hominids? How did they adapt to this northern climate?"

Potts speculates that the climate may have been relatively warm at the time and that the toolmakers had to adapt to life in the north because the massive Qinling Mountains blocked them from migrating south. To reach the site, *H. erectus* had to cross the Tibetan Plateau and somehow get around the Himalayas. Regardless of how they got there, says archaeologist Kathy Schick of Indiana University in Bloomington, who has worked at tool sites in the basin since 1989, these dates show that "very early on, *Homo* had the capability to spread out of Africa and to move significantly northward across long distances with relatively simple tool kits."

–ANN GIBBONS

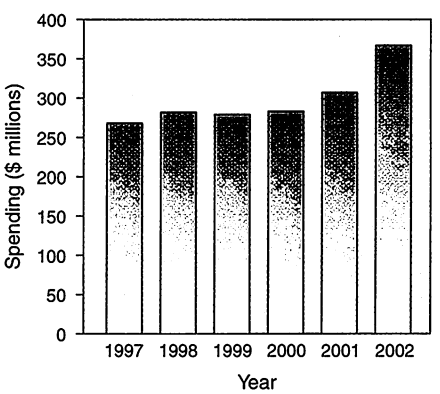
FRENCH SCIENCE

Budget Backs University Research, Job Creation

PARIS—As fears of war and economic recession sweep the world, French scientists got at least a sliver of good news last week. New budget proposals would boost grant money for long-suffering university researchers by nearly 20%, while public research agencies would be able to hire 500 additional researchers and technicians.

The big picture for science is more sobering. France's civilian R&D budget increase in 2002 would barely beat inflation, rising 2.2% to $8 billion. That modest growth would, however, put science in a better position than many other public sectors: The overall government budget is set to increase by a meager 0.5%. Not surprisingly, the mixed news is drawing mixed reviews: Whereas some French scientists welcome the spending plans, others complain that French R&D will gain little ground on R&D in the United States and other research powerhouses.

At an 18 September press conference announcing the new budget figures—which are subject to parliamentary approval later this year—French research minister Roger-



Good news. With a 19.3% increase next year, French university research would be a big winner.

ScienceScope

Self-Policing Clinical researchers at the University of Michigan (UM) are taking steps to keep ahead of ethics regulators. In a "proactive" move, says spokesperson Kara Garvin, a review of genetic and molecular medicine this year resulted in stepped-up oversight of all clinical protocols and a 3-year suspension of research privileges for Alfred Chang, a top cancer investigator.

The self-initiated audit, according to the university, turned up inadequate or late documentation of informed consent, noncompliance with protocols, and improper reporting of adverse events. Chang's suspension and a decision to quadruple spending on clinical oversight, announced several weeks ago, are designed to reinforce "the importance of the rules governing clinical research trials, particularly those protecting human volunteers," said UM vice president Gilbert Omenn.

In a Web posting (www.umich.edu/%7Enewsinfo/Releases/2001/Aug01/chang.html), Chang argues that many patients had benefited from his studies but acknowledges the need for better compliance with the rules.

Stem Cell Fight The Wisconsin Alumni Research Foundation (WARF), which holds the patent on human embryonic stem cells, has gone to court again in a bid to curb efforts by biotech company Geron to expand its claims over WARF's cell lines. The California company has an exclusive commercial license to use six types of cells derived from the Wisconsin stem cells, but it is claiming it still has an option for more.

WARF says no, it doesn't want all its cells tied up by Geron and unavailable to other researchers, and it filed suit on 13 August to get a federal court to back up its reading of its agreement with the company. This week, WARF added a stipulation to the complaint: It wants the court to declare that Geron—contrary to the company's claim—has no exclusive rights to "research products" of the stem cells, such as cell-based screening assays, except where they have been combined with Geron's own patented technology.

"We're anxious to be able to license other companies to make research products ... without the cloud of Geron claiming that we've breached the agreement," says WARF managing director Carl Gulbrandsen. A Geron spokesperson says the company doesn't comment on pending litigation.

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